

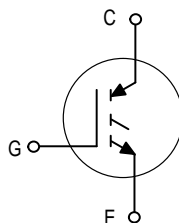
Product Preview Data Sheet

Insulated Gate Bipolar Transistor

N-Channel Enhancement Mode Silicon Gate

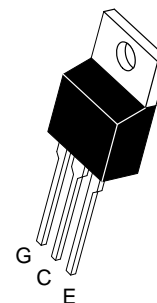
This Insulated Gate Bipolar Transistor (IGBT) uses an advanced termination scheme to provide an enhanced and reliable high voltage blocking capability. Its new 600V IGBT technology is specifically suited for applications requiring both a high temperature short circuit capability and a low $V_{CE(on)}$. It also provides fast switching characteristics and results in efficient operation at high frequencies. This new E-series introduces an Energy-efficient and short circuit rated device.

- Industry Standard TO-220 Package
- High Speed E_{off} : 44 μ J/A typical at 125°C
- High Short Circuit Capability – 10 μ s minimum at 125°C
- Low On-Voltage – 2.0V typical at 3A, 125°C
- Robust High Voltage Termination



MGP5N60E

IGBT IN TO-220
5 A @ 90°C
6 A @ 25°C
600 VOLTS
SHORT CIRCUIT RATED
LOW ON-VOLTAGE



CASE 221A-06, Style 9
TO-220AB

MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CES}	600	Vdc
Collector-Gate Voltage ($R_{GE} = 1.0 \text{ M}\Omega$)	V_{CGR}	600	Vdc
Gate-Emitter Voltage — Continuous	V_{GE}	± 20	Vdc
Collector Current — Continuous @ $T_C = 25^\circ\text{C}$	I_{C25}	6	Adc
— Continuous @ $T_C = 90^\circ\text{C}$	I_{C90}	5	
— Repetitive Pulsed Current (1)	I_{CM}	12	Apk
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	62 0.50	Watts W/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-55 to 150	°C
Short Circuit Withstand Time ($V_{CC} = 360 \text{ Vdc}$, $V_{GE} = 15 \text{ Vdc}$, $T_J = 125^\circ\text{C}$, $R_G = 20 \Omega$)	t_{sc}	10	μ s
Thermal Resistance — Junction to Case — IGBT	$R_{\theta JC}$	2.01	°C/W
— Junction to Ambient	$R_{\theta JA}$	65	
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 5 seconds	T_L	260	°C
Mounting Torque, 6-32 or M3 screw	10 lbf•in (1.13 N•m)		

(1) Pulse width is limited by maximum junction temperature.

This document contains information on a new product. Specifications and information are subject to change without notice.

MGP5N60E

ELECTRICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-to-Emitter Breakdown Voltage ($V_{GE} = 0\text{ Vdc}$, $I_C = 250\text{ }\mu\text{Adc}$) Temperature Coefficient (Positive)	$B_{V_{CES}}$	600 —	— 870	— —	Vdc mV/ $^\circ\text{C}$
Emitter-to-Collector Breakdown Voltage ($V_{GE} = 0\text{ Vdc}$, $I_{EC} = 100\text{ mAdc}$)	$B_{V_{ECS}}$	15	—	—	Vdc
Zero Gate Voltage Collector Current ($V_{CE} = 600\text{ Vdc}$, $V_{GE} = 0\text{ Vdc}$) ($V_{CE} = 600\text{ Vdc}$, $V_{GE} = 0\text{ Vdc}$, $T_J = 125^\circ\text{C}$)	I_{CES}	— —	— —	100 2500	μAdc
Gate-Body Leakage Current ($V_{GE} = \pm 20\text{ Vdc}$, $V_{CE} = 0\text{ Vdc}$)	I_{GES}	—	—	250	nAdc

ON CHARACTERISTICS (1)

Collector-to-Emitter On-State Voltage ($V_{GE} = 15\text{ Vdc}$, $I_C = 1.5\text{ Adc}$) ($V_{GE} = 15\text{ Vdc}$, $I_C = 1.5\text{ Adc}$, $T_J = 125^\circ\text{C}$) ($V_{GE} = 15\text{ Vdc}$, $I_C = 3\text{ Adc}$)	$V_{CE(on)}$	— — —	1.58 1.46 2.02	2.06 — 2.77	Vdc
Gate Threshold Voltage ($V_{CE} = V_{GE}$, $I_C = 1\text{ mAdc}$) Threshold Temperature Coefficient (Negative)	$V_{GE(th)}$	4.0 —	6.0 10	8.0 —	Vdc mV/ $^\circ\text{C}$
Forward Transconductance ($V_{CE} = 10\text{ Vdc}$, $I_C = 3\text{ Adc}$)	g_{fe}	—	1.3	—	Mhos

DYNAMIC CHARACTERISTICS

Input Capacitance	$(V_{CE} = 25\text{ Vdc}$, $V_{GE} = 0\text{ Vdc}$, $f = 1.0\text{ MHz}$)	C_{ies}	—	362	—	pF
Output Capacitance		C_{oes}	—	36	—	
Transfer Capacitance		C_{res}	—	3	—	

SWITCHING CHARACTERISTICS (1)

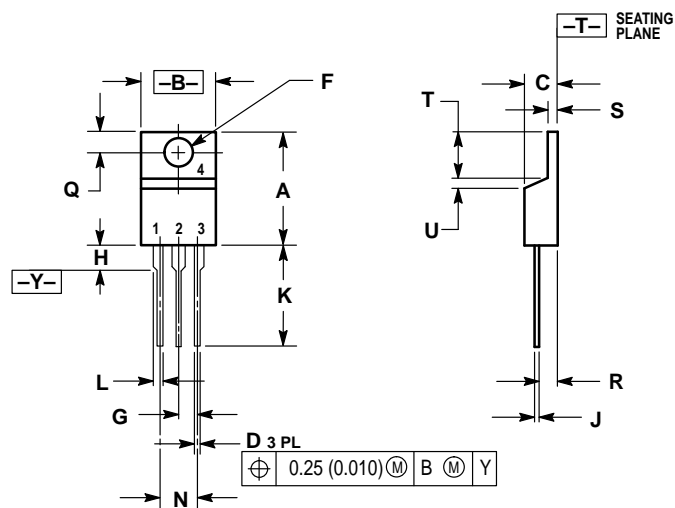
Turn-On Delay Time	$(V_{CC} = 360\text{ Vdc}$, $I_C = 3\text{ Adc}$, $V_{GE} = 15\text{ Vdc}$, $L = 300\text{ }\mu\text{H}$ $R_G = 20\text{ }\Omega$, $T_J = 25^\circ\text{C}$) Energy losses include "tail"	$t_{d(on)}$	—	tbd	—	ns
Rise Time		t_r	—	tbd	—	
Turn-Off Delay Time		$t_{d(off)}$	—	60	—	
Fall Time		t_f	—	218	—	
Turn-Off Switching Loss		E_{off}	—	0.09	0.14	mJ
Turn-On Delay Time	$(V_{CC} = 360\text{ Vdc}$, $I_C = 3\text{ Adc}$, $V_{GE} = 15\text{ Vdc}$, $L = 300\text{ }\mu\text{H}$ $R_G = 20\text{ }\Omega$, $T_J = 125^\circ\text{C}$) Energy losses include "tail"	$t_{d(on)}$	—	tbd	—	ns
Rise Time		t_r	—	tbd	—	
Turn-Off Delay Time		$t_{d(off)}$	—	tbd	—	
Fall Time		t_f	—	tbd	—	
Turn-Off Switching Loss		E_{off}	—	0.13	—	mJ
Gate Charge	$(V_{CC} = 360\text{ Vdc}$, $I_C = 3\text{ Adc}$, $V_{GE} = 15\text{ Vdc}$)	Q_T	—	14	—	nC
		Q_1	—	6	—	
		Q_2	—	4	—	

INTERNAL PACKAGE INDUCTANCE

Internal Emitter Inductance (Measured from the emitter lead 0.25" from package to emitter bond pad)	L_E	—	7.5	—	nH
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(1) Pulse Test: Pulse Width $\leq 300\text{ }\mu\text{s}$, Duty Cycle $\leq 2\%$.

PACKAGE DIMENSIONS




**CASE 221A-06
TO-220AB
ISSUE Y**

- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.560	0.625	14.23	15.87
B	0.380	0.420	9.66	10.66
C	0.140	0.190	3.56	4.82
D	0.020	0.045	0.51	1.14
F	0.139	0.155	3.53	3.93
G	0.100 BSC		2.54 BSC	
H	—	0.280	—	7.11
J	0.012	0.045	0.31	1.14
K	0.500	0.580	12.70	14.73
L	0.045	0.070	1.15	1.77
N	0.200 BSC		5.08 BSC	
Q	0.100	0.135	2.54	3.42
R	0.080	0.115	2.04	2.92
S	0.020	0.055	0.51	1.39
T	0.235	0.255	5.97	6.47
U	0.000	0.050	0.00	1.27

- STYLE 9:
- PIN 1: GATE
2. COLLECTOR
3. EMITTER
4. COLLECTOR

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